Best care Always!

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FOR THE NEWBORN

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"Our future lies in collaboration and sharing best practice..."

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Introduction

The BCA team has in principle agreed to introduce Best Care Always in Paediatrics. After much analysis a consensus was reached to use neonatology as a point of entry. This decision was based on the mortality and morbidity associated with the vulnerable newborn baby. Furthermore the first phase of the BCA FOR THE NEWBORN will focus on a group of babies that shows greatest risk of poor outcomes viz. the Very Low Birth Weight infant (VLBW). These are infants born with a Birth weight of <1.5 kg. It is envisaged that the lessons learned from this group will constitute the second phase of the campaign to cover all newborn babies of >1.5kg. Our overarching approach was to identify the leading causes of morbidity and mortality in this category of newborn babies. To start with seven bundles have been identified:

A. The Screening bundle
B. ROP (Retinopathy of Prematurity) bundle
C. CLD (Chronic Lung Disease) bundle
D. NEC (Necrotising Enterocolitis) bundle
E. PIH (Periventricular-Intraventricular Haemorrhage) bundle
F. The Neonatal Sepsis bundle
   F1. Early Bacterial Sepsis (EBS)
   F2. Late Onset Infections (LOI)
G. Pneumothorax bundle

Acronyms

ART Anti Retroviral Therapy

BCA Best Care Always

CLABSI Central Line Associated Bloodstream Infection

CLD Chronic Lung Disease

CPAP Continuous Positive Airway Pressure

CRP C - reactive protein

CV Conventional Ventilator

EBM Expressed Breast Milk

EBS Early Bacterial Sepsis

FBC Full Blood Count

FiO_2 Fraction of inspired Oxygen

GBS Group B Streptococci

HAART Highly Active Antiretroviral Therapy

HFO High Frequency Oscillator

HIV Human Immunodeficiency Virus

LOI Late Onset Infections

NCPAP Nasal Continuous Positive Airway Pressure

NEC Necrotising Enterocolitis

NPO Nasal Prongs Oxygen

PCT Procalcitonin

PIH Periventricular-Intraventricular Haemorrhage

PIP Peak Inspiratory Pressure

PMTCT Prevention of Mother To Child Transmission

ROP Retinopathy of Prematurity

VLBW Very Low Birth Weight

BCA Dashboard of Neonatal Clinical Indicators for VLBW infants

BCA DASHBOARD OF NEONATAL CLINICAL INDICATORS FOR VLBW	**INTERNATIONAL OUTCOMES BENCHMARK**	Q1	Q2	Q3	Q4
A. Screening bundle					
A1. Antenatal Steroid Usage Compliance Rate	**80%**				
A2. HIV Screening Compliance Rate	**100%**				
A3. HIV PMTCT Compliance Rate	**100%**				
A4. Syphilis Screening Compliance Rate	**100%**				
A5. Early CPAP Compliance Rate	**60%**				
A6. Cranial Ultrasound Imaging Compliance Rate	**100%**				
A7. Retinal Exam Compliance Rate	**100%**				
A8. Caesarean Section Rate	**100%**				
B. ROP rate	**25%**				
C. CLD rate	**15%**				
D. NEC rate	**6%**				
E. PIH rate	**10%**				
F1. Early Bacterial Sepsis rate	**2%**				
F2. Late Onset Infection rate	**9%**				
G. Pneumothorax rate	**4%**				

Measurements in the Screening Bundle

A. Screening bundle

A1. Antenatal steroid usage compliance rate

Definition: to calculate the percentage of VLBW infants whose mothers receive steroids when preterm delivery becomes inevitable

Denominator (D): all VLBW born in the unit over a specific period

Numerator (N): number of VLBW whose mothers prescription charts indicate that at least one dosage of intramuscular or intravenous steroid had been administered

Expression of the value as a percentage: N/D X 100

A2. Antenatal HIV screening compliance rate

Definition: to calculate the percentage of VLBW infants whose mothers were screened for HIV during pregnancy

Denominator (D): all VLBW born in the unit over a specific period

Numerator (N): number of VLBW who were given full benefit of PMTCT (Prevention of Mother To Child Transmission) antiretroviral therapy including the mother as per guidelines of the National Department of Health

Expression of the value as a percentage: N/D X 100

A3. HIV PMTCT (Prevention-of-Mother-To- Child Transmission) compliance rate

Definition: to calculate the percentage of VLBW borne of HIV infected mothers who were given full benefit (mother + child) of antiretroviral therapy

Denominator (D): all VLBW born of HIV positive mothers

Numerator (N): number of VLBW who were given the "full benefit" of antiretroviral therapy.

Full benefit entails:

Mother	ART during pregnancy	ART during labor	ART after birth
Baby	ART	Vitamin A	

Expression of the value as a percentage: N/D X 100

A4. Antenatal Syphilis screening compliance rate

Definition: to calculate the percentage of VLBW infants whose mothers were screened for Syphilis during pregnancy

Denominator (D): all VLBW born in the unit over a specific period

Numerator (N): number of VLBW infants whose mothers were screened for Syphilis during pregnancy

Expression of the value as a percentage: N/D X 100

A5. Early NCPAP compliance rate

Definition: To calculate the percentage of VLBW borne on ventilatory support (HFO and CV) who had the benefit of Early NCPAP

Denominator (D): all VLBW born in the unit who are ventilator support (NCPAP + Conventional Ventilator+ Oscillator).

Numerator (N): number of VLBW who were given the full benefit of NCPAP support within 2 hours of birth

Expression of the value as a percentage: N/D X 100

A6. Cranial Ultrasound Imaging compliance rate

Definition: to calculate the percentage of VLBW that survives to a week who get the benefit of cranial ultrasound imaging within 7 days of life. This screening test is aimed at detecting and grading intraventricular haemorrhage, a major cause of hydrocephalus and neurodevelopmental deficit in children.

Denominator (D): all VLBW born in the unit over a specific period

Numerator (N): number of VLBW who were given the full benefit of cranial ultrasound imaging within 7 days of life.

Expression of the value as a percentage: N/D X 100

A7. Retinal Examination Compliance Rate

Definition: to calculate the percentage of VLBW that survives to 6 weeks who get the benefit of an eye screening test at around 6 weeks of life. The purpose of this screening test is to detect and grade any Retinopathy of Prematurity (ROP), one of the most common causes of childhood blindness.

Denominator (D): all VLBW born in the unit over a specific period

Numerator (N): number of VLBW who had an eye screening test at around six weeks of life.

Expression of the value as a percentage: N/D X 100

A8. Caesarean Section Compliance Rate

Definition: to calculate the percentage of VLBW who were delivered by Caesarean section.

Denominator (D): all VLBW born in the unit over a specific period

Numerator (N): number of VLBW who were delivered by Caesarean section

Expression of the value as a percentage: N/D X 100

Evidence-based interventions, measurements and diagnostic criteria for bundles

B. Retinopathy of Prematurity (ROP) bundle

Interventions aimed at reducing the incidence of ROP:

1. All VLBW infants on oxygen need continuous transcutaneous oxygen monitoring

2. Site of the probe should be right or left hand (preductal saturation)

3. Saturation to be maintained between 86-92%

4. Saturation monitor alarm to be set at 85 (low) and 93 (high)

5. All VLBW infants to be screened for ROP before discharge

Measuring ROP outcomes

Definition: to calculate the percentage of VLBW with Grade 1-5 ROP

Denominator (D): all VLBW born in the unit

Numerator (N): number of VLBW with Grade 1-5 ROP diagnosed by a qualified ophthalmologist

Expression of the value as a percentage: N/D X 100

ROP diagnostic criteria based on fundoscopy done by an ophthalmologist

Stage 1: Identification of a demarcation line between normal and abnormal vessels

Stage 2: Presence of intra-retinal ridges

Stage 3: Presence of intra-retinal ridge plus evidence of extra-retinal fibrovascular proliferation

Stage 4: Partial retinal detachment

Stage 5: Total retinal detachment

C. Chronic Lung Disease (CLD) bundle

Interventions aimed at reducing the incidence of CLD:

1. Prescription of antenatal betamethasone in a pregnancy of 28-34 weeks were preterm labor is inevitable

2. Neopuff used in neonatal resuscitation

3. Gentle ventilation where indicated: Early NCPAP ⇨ HFO ⇨ CV (with limited PIP)

4. Permissive hypercapnia (PCO_2 > 45mmHg)

5. Prescription of systemic steroids to the infant to prevent or treat CLD

Measuring CLD outcomes

Definition: to calculate the percentage of VLBW with CLD

Denominator (D): all VLBW who needed invasive respiratory support (CV or HFO)

Numerator (N): number of VLBW given invasive respiratory support (CV or HFO) and still needing oxygen at 36 weeks of corrected age.

Expression of the value as a percentage: N/D X 100

CLD diagnostic criteria

Mild CLD: infant still needing oxygen supplementation at 28 days

Moderate CLD: requiring oxygen at 36 weeks of corrected age but FiO_2 of < 30%

Severe CLD: requiring oxygen at 36 weeks of corrected age with FiO_2 of > 30% or needing some form of ventilatory support

*Chest X-ray changes should be used to validate the diagnosis

D. Necrotising Enterocolitis (NEC) bundle

Interventions aimed at reducing the incidence of (NEC):

1. Promote breast milk (Including pasteurised EBM)

2. Adherence to acceptable feeding protocols in terms of

2.1 trophic feeds within 24 hours of birth

2.2 volumes per day over 5 days

2.3 frequency of feeding towards full feeds

***2.2 Recommended volume of feeds**

Day 1	Day 2	Day 3	Day 4	Day 5
70ml/kg/day	90ml/kg/day	110ml/kg/day	120ml/kg/day	150ml/kg day

***2.3 Recommended frequency of feeding towards full feeds**

1 hourly ⇨ 2 hourly ⇨ 3 hourly

Measuring the rate of NEC

Definition: to calculate the percentage of VLBW with evidence of NEC

Denominator (D): all VLBW born in the unit

Numerator (N): number of VLBW with evidence of NEC

Expression of the value as a percentage: N/D X 100

NEC diagnostic criteria

Clinical: abdominal distension, vomiting or bile-stained gastric aspirates, bloody stools

Biological surrogate markers: Rising CRP, high PCT and FBC changes

Microbiological: positive specimen culture results

Radiological: typical pneumatosis intestinals or pneumoperitoneum or air in the hepato-biliary system

E. PIH (Periventricular-Intraventricular Haemorrhage) bundle

Interventions aimed at reducing the incidence of PIH:

1. Prescription of antenatal betamethasone in a pregnancy of 28-34 weeks were preterm labor is inevitable

2. Delayed cord clamping for 45 seconds to a minute

3. Neopuff use for resuscitation to prevent pneumothorax

4. Maintain infant T^{o} of ≥36^{0} C

5. Developmental care: dim lights, low levels of noise

Measuring the rate of PIH

Definition: to calculate the percentage of VLBW with PIH

Denominator (D): all VLBW born in the unit

Numerator (N): number of VLBW with ultrasound l evidence of PIH

Expression of the value as a percentage: N/D X 100

PIH diagnostic criteria based on cranial ultrasonography

Grade 1: Periventricular subependymal germinal matrix bleeding

Grade 2: Intraventricular Haemorrhage with no ventricular dilatation

Grade 3: Intraventricular Haemorrhage with ventricular dilatation

Grade 4: Periventricular or Intraventricular Haemorrhage with evidence of parenchymal involvement

F1. Early Bacterial Sepsis (EBS) bundle

Interventions aimed at reducing the incidence of (EBS):

1. Proactive screening, diagnosis and treatment of Chorioamnionitis

2. Antenatal screening of GBS at 36 weeks gestation and intrapartum antibiotic treatment

3. Routine sampling of Gastric aspirates at birth and after 24 hrs

Measuring the rate of EBS

Definition: to calculate the percentage of VLBW with clinical, biochemical, microbiological or radiological evidence of bacterial infection within 72 hours of birth

Denominator (D): all VLBW born in the unit

Numerator (N): number of VLBW with clinical, biochemical or microbiological evidence of bacterial infection within 72 hours of birth

Expression of the value as a percentage: N/D X 100

EBS diagnostic criteria

Clinical: evidence of sepsis within 72 hours of birth such as unexplainable apnoeas and or bradychardia, poor peripheral perfusion, plummeting blood pressure, mottled skin appearance and congenital pneumonia

Biological surrogate markers: Rising CRP, high PCT and FBC changes

Microbiological: positive specimen culture results

Radiological: pneumonia on chest X-ray

Chorioamnionitis surveillance criteria

- Risk factors: Preterm labor, Prelabor Rupture of Membranes , Prolonged Rupture of Membranes or Prolonged labor
- Maternal low grade or high grade fever
- Uterine tenderness
- Fetal tachychardia
- Maternal tachycardia
- Purulent or foul-smelling amniotic fluid

GBS screening criteria

- Clinical criteria: evidence of chorioamnionitis as stated above
- Microbiological screening for perineal colonisation

  Mandatory 3rd trimester recto-vaginal swabbing or GBS urine culture

F2. Late Onset Infections (LOI) bundle

Interventions aimed at reducing the incidence of (LOI):

1. Comprehensive Infection Prevention and Control measures

2. Regular hand-washing campaigns and compliance measure thereof

3. Limited use of central lines

4. Full implementation of the CLABSI bundle where central lines are indicated

5. Promote Antibiotic stewardship

Measuring the rate of LOI

Definition: to calculate the percentage of VLBW with clinical, biochemical, microbiological or radiological evidence of bacterial infection after 72 hours of birth

Denominator (D): all VLBW born in the unit

Numerator (N): number of VLBW with clinical, biochemical or microbiological evidence of bacterial infection after 72 hours of birth

LOI diagnostic criteria

* These infections are often hospital acquired and therefore may be bacterial, fungal or even viral

Clinical: evidence of sepsis after 72 hours of birth such as unexplainable apnoeas and or bradychardia, poor peripheral perfusion, plummeting blood pressure, mottled skin appearance and congenital pneumonia

Biological surrogate markers: Rising CRP, high PCT and FBC changes

Microbiological: positive specimen culture results

Radiological: pneumonia on chest X-ray

G. Pneumothorax bundle

Interventions aimed at reducing the incidence of Pneumothorax:

1. Resuscitation with a neopuff

2. Surfactant given early in severe HMD

4. Gentle ventilation in those VLBW needing support: Early NCPAP ⇨ HFO ⇨ CV (with limited PIP)

Measuring the rate of Pneumothorax

Aim: to calculate the percentage of VLBW with Pneumothorax

Denominator (D): all VLBW born in the unit

Numerator (N): number of VLBW with clinical or radiological evidence of pneumothorax

Expression of the value as a percentage: N/D X 100

Pneumothorax diagnostic criteria

Clinical: hyper-resonance on percussion and reduced air-entry on auscultation

Cold light: Transillumination halo

Chest X-ray: typical area of exaggerated radiolucency

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